



Supplement of

Response of soil nutrients and erodibility to slope aspect in the northern agro-pastoral ecotone, China

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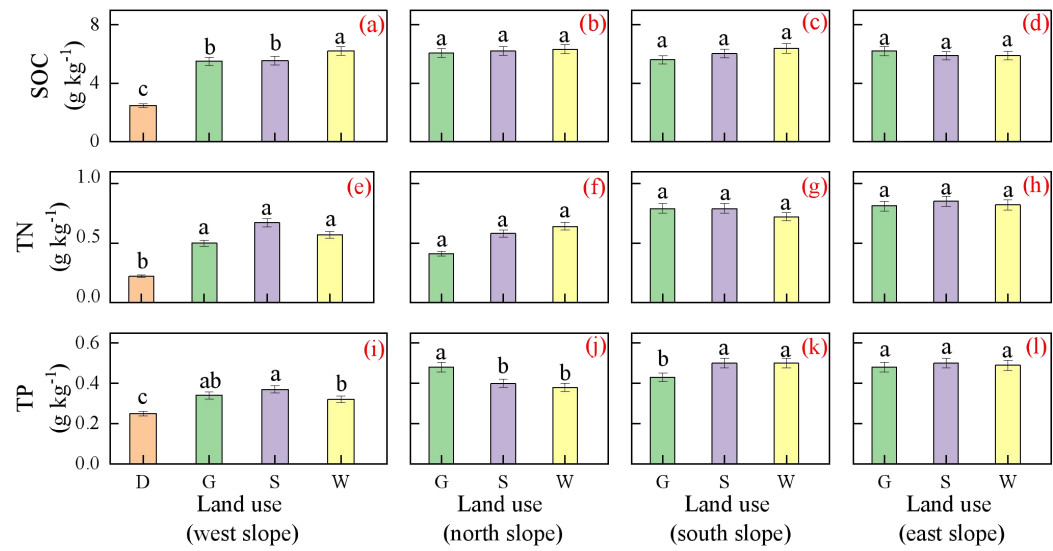


Fig. S1. Variation of soil nutrients indicators with land use along slope aspects. D, degraded land; G, grassland; S, shrubland; W, woodland. Different letters indicate significant differences among different seasons at $P < 0.05$ level.

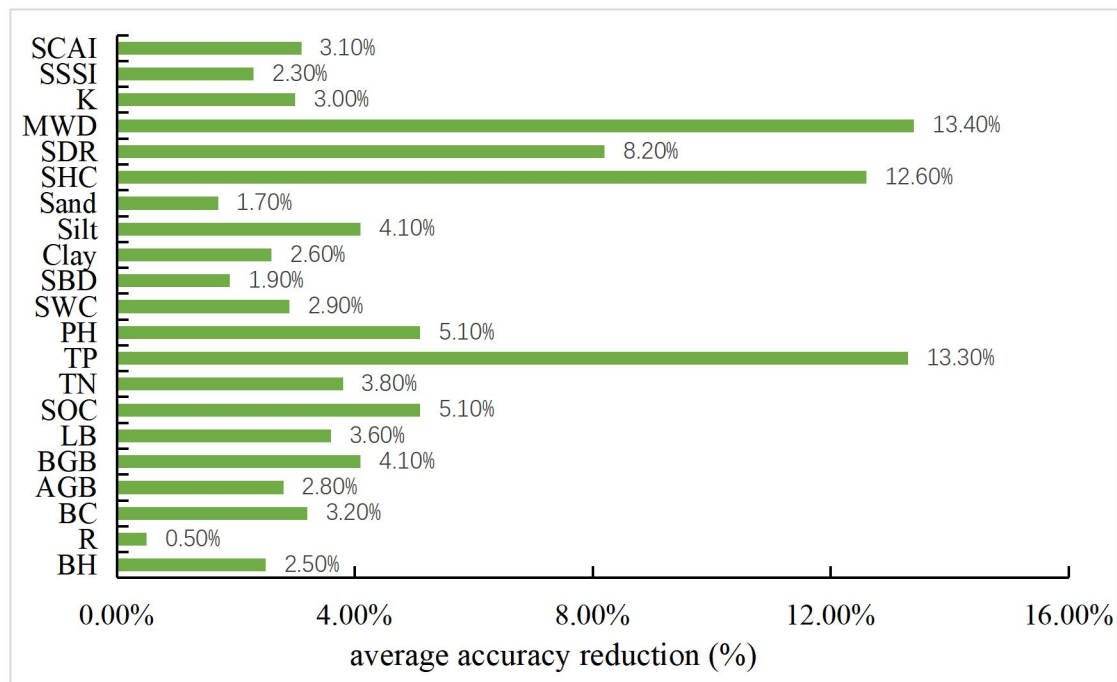


Fig. S2. Important rank under different slope aspects. SBD, soil bulk density; Sand: sand content; Silt: silt content; Clay: clay content.

Table S1 Understory vegetation characteristics of different vegetation types at different slope aspect. Values are in the form of the mean \pm standard error. Different capital letters indicate significant differences between slope aspects ($p < 0.05$), different lowercase letters indicate significant differences between the four vegetation types ($p < 0.05$).

Slope aspect	Land use	Site code	Dominated plant communities	Dominant herbaceous plant	Biomass height (m)	Richness	Biomass coverage (%)	Aboveground biomass (g m ⁻²)	Belowground biomass (g m ⁻²)	Litter biomass (g m ⁻²)
W	Degraded land	WDAA	Artemisia annua	Potentilla chinensis, Artemisia annua	0.24 \pm 0.02aA	0.71 \pm 0.04aA	20.11 \pm 6.88bA	55.94 \pm 3.52aB	26.48 \pm 4.39bB	54.49 \pm 4.42dA
	grassland	WGAM	Astragalus melilotoides	Astragalus melilotoides	0.45 \pm 0.08aA	1.15 \pm 0.02aA	49.42 \pm 20.53aA	270.88 \pm 56.11aB	39.19 \pm 22.50aB	96.92 \pm 24.63cA
		WGCP	Capillipedium parviflorum	Capillipedium parviflorum	0.55 \pm 0.11aA	1.12 \pm 0.09aA	47.61 \pm 24.66aA	253.4 \pm 30.09aB	73.92 \pm 17.54aB	96.45 \pm 17.50cA
	shrubland	WSHR	Hippophae rhamnoides	Artemisia sacrorum, Capillipedium parviflorum	0.54 \pm 0.17aA	1.14 \pm 0.06aA	28.67 \pm 4.73bA	236.15 \pm 36.57aB	26.61 \pm 9.87bB	141.5 \pm 10.99aA
		WSCK	Caragana korshinskii	Artemisia sacrorum, Capillipedium parviflorum	0.67 \pm 0.39aA	1.13 \pm 0.02aA	30.94 \pm 17.13bA	312.83 \pm 8.12aB	29.65 \pm 1.09bB	135.2 \pm 10.50aA
	Woodland	WWLG	Larix gmelinii	Astragalus melilotoides, Artemisia sacrorum	0.71 \pm 0.05bA	1.17 \pm 0.07bA	35.27 \pm 18.32bA	268.23 \pm 30.21bB	76.71 \pm 6.07aB	122 \pm 7.99bA
		WWPS	Pinus sylvestris	Astragalus melilotoides, Artemisia sacrorum	0.63 \pm 0.14bA	1.11 \pm 0.04bA	32.67 \pm 13.05bA	350.14 \pm 12.38bB	49.17 \pm 13.71aB	113.46 \pm 7.43bA
	N	grassland	NGAM	Astragalus	Astragalus	0.55 \pm 0.09aA	1.02 \pm 0.17aA	37.79 \pm 1.91aA	292.97 \pm 62.32aA	62.75 \pm 20.67aA

		melilotoides	melilotoides				B	B	A
	NGBI	Bothriochloa ischaemum	Bothriochloa ischaemum (L.) Keng	0.56±0.06aA	1.01±0.17aA	67.41±1.28aA	282.81±70.70aA B	79.76±12.14aA B	89.55±13.09c A
shrubland	NSHR	Hippophae rhamnoides	Astragalus melilotoides, Potentilla chinensis	0.72±0.06aA	1.2±0.11aA	56.78±20.08a A	305.83±19.11aA B	46.69±20.66aA B	175.16±12.81 aA
	NSCK	Caragana korshinskii	Artemisia sacrorum, Capillipedium parviflorum	0.41±0.05aA	1.09±0.04aA	25.11±6.71aA	300.94±33.44aA B	43.08±8.75aAB	167.37±12.24 aA
Woodland	NWLG	Larix gmelinii	Artemisia sacrorum, Capillipedium parviflorum	0.77±0.06aA	1.12±0.08aA	31.79±28.25a A	295.86±32.64aA B	88.27±6.15aAB	140.2±16.10b A
	NWPS	Pinus sylvestris	Astragalus melilotoides	0.63±0.05aA	1.13±0.02aA	63.67±14.98a A	411.27±49.26aA B	47.07±9.84aAB	130.38±14.98 bA
grassland	SGAM	Astragalus melilotoides	Astragalus melilotoides	0.51±0.08bA	1.12±0.01aA	43.46±13.38a bA	304.11±14.56bA B	77.84±42.56aA B	110.62±23.76 cA
	SGCP	Capillipedium parviflorum	Capillipedium parviflorum	0.42±0.15bA	1.18±0.09aA	40.55±12.51a bA	276.32±63.54bA B	76.38±49.01aA B	108.54±6.02c A
S	SSHR	Hippophae rhamnoides	Artemisia sacrorum, Potentilla chinensis	0.66±0.12bA	1.19±0.11aA	28.33±18.58b A	397.55±19.17aA B	56.71±6.77aAB	207.31±14.62 aA
shrubland	SSCK	Caragana korshinskii	Capillipedium parviflorum, Lespedeza bicolor	0.41±0.05bA	1.1±0.03aA	25.11±5.42bA	361.4±11.68aAB	47.7±7.11aAB	198.08±13.97 aA
Woodland	SWLG	Larix gmelinii	Artemisia sacrorum	0.75±0.01aA	1.09±0.12aA	54.67±21.36a	317.5±20.12aAB	91.97±3.46aAB	149.14±12.11

E	grassland	SWPS	Pinus sylvestris	Astragalus melilotoides, Artemisia sacrorum	0.69±0.10aA	1.1±0.11aA	60±17.58aA	459.27±38.92aA B	73.73±7.92aAB	138.7±11.27b A
		EGAS	Astragalus melilotoides	Artemisia sacrorum	0.54±0.12aA	0.9±0.06aA	55.87±14.29a A	337.29±56.74bA	109.63±18.71a A	106.87±15.61 cA
		EGSM	Astragalus melilotoides	Artemisia sacrorum	0.55±0.12aA	0.96±0.11aA	51.75±23.80a A	350.39±37.68bA	103.14±3.28aA	114.63±2.93c A
	shrubland	ESHR	Hippophae rhamnoides	Artemisia sacrorum, Potentilla chinensis	0.7±0.24aA	1.27±0.08aA	37.22±6.74aA	428.69±34.74ab A	63.33±3.28cA	214.75±32.17 aA
		ESCK	Caragana korshinskii	Capillipedium parviflorum, Lespedeza bicolor	0.69±0.38aA	1.05±0.01aA	35.42±17.95a A	414.61±34.58ab A	49.49±13.33cA	205.19±30.74 aA
	Woodland	EWLG	Larix gmelinii	Artemisia sacrorum	0.77±0.11aA	1.03±0.25aA	40.1±12.90aA	364.47±53.42aA	92.56±5.59bA	152.01±9.17b A
		EWPS	Pinus sylvestris	Astragalus melilotoides	0.6±0.15aA	0.9±0.22aA	59±13.89aA	552.13±32.97aA	73.8±13.84bA	141.37±8.53b A

Table S2 Soil characteristics of different vegetation types at different slope aspect. Values are in the form of the mean ± standard error. SWC: soil water content; SBD: soil bulk density; SOC: soil organic carbon; TN: text Normalization; TP: total phosphorus. Different capital letters indicate significant differences between slope aspects ($p < 0.05$), different lowercase letters indicate significant differences between the four vegetation types ($p < 0.05$).

Slope aspect	Land use	Site code	SWC (%)	BD (g cm ⁻³)	Clay (%)	Silt (%)	Sand (%)	pH
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W	Degraded land	WDAA	0.08±0.03cC	1.63±0.03aA	10.25±0.23dD	9.12±0.12bB	80.63±0.32abAB	8.5±0.11aA
	grassland	WGAM	0.1±0.01bcC	1.58±0.01aA	13.63±0.09bD	5.22±0.17cB	81.15±0.14aAB	7.6±0.19bA
		WGCP	0.1±0.03bcC	1.66±0.03aA	13.19±0.09bD	5.52±0.17cB	81.29±0.14aAB	7.44±0.19bA
	shrubland	WSHR	0.11±0.02abC	1.25±0.02bA	12.42±0.23cD	8.36±0.21bB	79.21±0.28bAB	6.97±0.07cA
		WSCK	0.13±0.01abC	1.23±0.03bA	12.86±0.23cD	8.06±0.21bB	79.07±0.28bAB	6.99±0.07cA
	Woodland	WWLG	0.12±0.01aC	1.26±0.02bA	20.11±0.34aD	18.77±0.43aB	61.12±0.77cAB	7.53±0.02bA
		WWPS	0.16±0.01aC	1.24±0.01bA	20.55±0.26aD	18.47±0.17aB	60.98±0.43cAB	7.55±0.02bA
	grassland	NGAM	0.1±0.03bBC	1.56±0.01aA	13.45±0.36bB	7.49±0.33bC	79.06±0.28bA	7.48±0.05aB
		NGBI	0.1±0.01bBC	1.63±0.13aA	13.01±0.36bB	7.79±0.33bC	79.2±0.28bA	7.33±0.05aB
	N	shrubland	NSHR	0.12±0.04abBC	1.22±0.13bA	10.79±0.46cB	7.62±1.88bC	81.59±1.45cA
NSCK			0.12±0.02abBC	1.2±0.07bA	11.23±0.46cB	7.32±1.88bC	81.45±1.45cA	6.85±0.10bB
Woodland		NWLG	0.13±0.01aBC	1.25±0.07bA	18.38±0.08aB	28.19±0.28aC	53.43±0.29aA	7.48±0.05aB
		NWPS	0.16±0.01aBC	1.22±0.02bA	18.82±1.00aB	27.89±0.28aC	53.29±0.72aA	7.5±0.05aB
S	grassland	SGAM	0.1±0.01bAB	1.53±0.02aB	14.73±0.22bC	4.45±0.39cB	80.82±0.61aB	7.35±0.04aC
		SGCP	0.11±0.02bAB	1.6±0.08aB	14.29±0.22bC	4.75±0.39cB	80.96±0.61aB	7.2±0.03aC
	shrubland	SSHR	0.12±0.02aAB	1.21±0.08bB	11.56±0.09cC	8.03±0.15bB	80.42±0.24bB	6.56±0.04bC
		SSCK	0.13±0.01aAB	1.19±0.13bB	12±0.09cC	7.73±0.15bB	80.28±0.24bB	6.58±0.04bC
	Woodland	SWLG	0.13±0.03aAB	1.24±0.13bB	20.09±0.23aC	29.93±0.29aB	49.98±0.13cB	7.29±0.05aC
		SWPS	0.16±0.01aAB	1.22±0.07bB	20.53±0.35aC	29.63±0.29aB	49.84±0.62cB	7.3±0.05aC
E	grassland	EGAS	0.11±0.01aA	1.34±0.11aB	13.44±0.13bA	6.55±0.12bA	80.01±0.01bC	7.16±0.02bB
		EGSM	0.11±0.02aA	1.41±0.12aB	13±0.13bA	6.85±0.12bA	80.15±0.01bC	7.01±0.01bB
	shrubland	ESHR	0.11±0.01abA	1.14±0.09bB	10.65±1.04cA	6.15±1.22bA	83.2±1.30aC	6.34±0.27cB
		ESCK	0.14±0.02abA	1.12±0.05bB	11.09±1.04cA	5.85±1.22bA	83.06±1.30aC	6.36±0.27cB
	Woodland	EWLG	0.13±0.01bA	1.2±0.03bB	18.94±0.20aA	25.01±0.22aA	56.05±0.02cC	7.26±0.04aB
		EWPS	0.17±0.01bA	1.17±0.03bB	19.38±0.20aA	24.71±0.22aA	55.91±0.02cC	7.28±0.04aB

